# BIO Advisory Committee

**Joann P. Roskoski**

**Acting Assistant Director**

**Directorate for Biological Sciences**

**October 6, 2010**

# NSF Staffing Updates

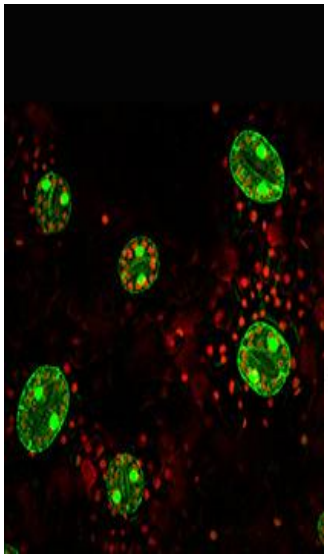
- NSF Director: Subra Suresh - October 15

- BIO Assistant Director: *Pending*
- CISE Assistant Director: Peter Arzberger (Acting)
- MPS Deputy Assistant Director: Machi Dilworth (Acting)

- BIO Senior Staff:
  - IOS Division Director: John C. Wingfield
  - DBI Division Director: Judy Verbeke (Acting)
  - IOS Deputy Division Director: Jane Silverthorne

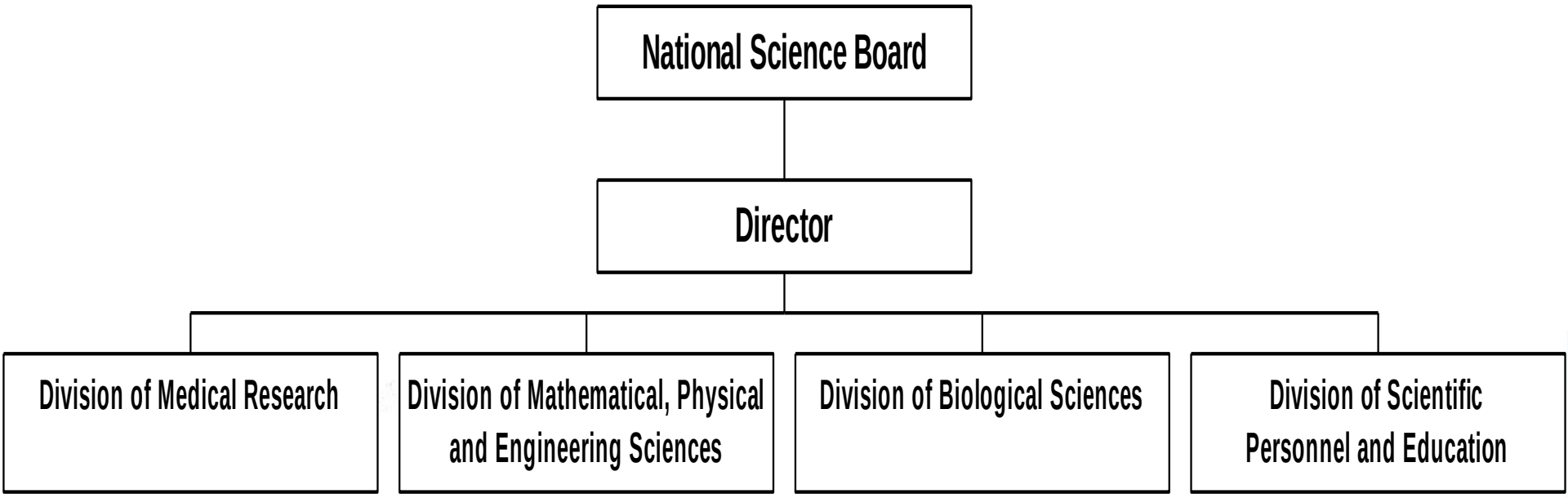
# NSF's Sensational 60 Years

The FY 2011 budget keeps the agency at the forefront of science and engineering innovation, where it has been since its founding in 1950.



# BIO's Sensational 60 Years

National Science Foundation
Organization Prescribed in the Enabling Act




# BIO's first born…

**Control of Metamorphosis in *Hyla brunnea***

**Award Amount - $1000**

1952 BIO Award Data

72 of total 98 Awards
Average Award Size - $10,897
($88,221 in 2009 Dollars)

# Look at us now…

2009 BIO Award Data

# of Awards - 1823
Average Award Size - $199,695

# Administration Priorities

- Economic prosperity, creating the industries and jobs of the future
- Energy, environment, sustainability
- Education (particular emphasis on STEM)

# Open Government Directive Requires Agencies to:

- Publish government information online
  - high-value data in an online open format (platform independent, machine readable)
- Improve the quality of government information
- Institutionalize a culture of open government
  - each agency has Open Government Plan
- Create a policy framework for open government

# NSF Open Gov't Website

- www.nsf.gov/open/
  - NSF Freedom of Information Act Report Oct08-Sep09
  - NSF GRF award recipients: 2000-2009
  - NSF GRF Honorable Mention Recipients: 2000-2009
  - NSF Research Grant Funding Rates
  - Nat'l Survey of: College Grads, Recent College Grads, Dr. Recipients
  - Research Spending and Results
  - Key Science and Engineering Indicators: Digest 2010
  - NSF Grants Mgmt and Info Research Spending and Results
  - Comprehensive Info on Federal Spending by Agency and Spending Type
  - NSF Spending Under the ARRA of 2009
  - Performance of NSF Major IT Investments (Exhibit 300s): IT Dashboard

# Prizes / Challenges

- In 2010 OMB provided guidance on the use of Challenges and Prizes to promote open government and innovation.
- In a challenge: "seeker" challenges a "solver" to solve a problem or rewards contestants for accomplishing a particular goal.
  - Incentive prizes (monetary or non–monetary) often accompany innovation challenges and contests.
  - Challenges can range from fairly simple (idea suggestions, creation of logos, videos, games, mobile apps) to proofs of concept, or solving the grand challenges of our time.
- Online challenge platform **www.challenge.gov** established
- President is encouraging EVERY agency to participate

# How Can the BIO AC Help

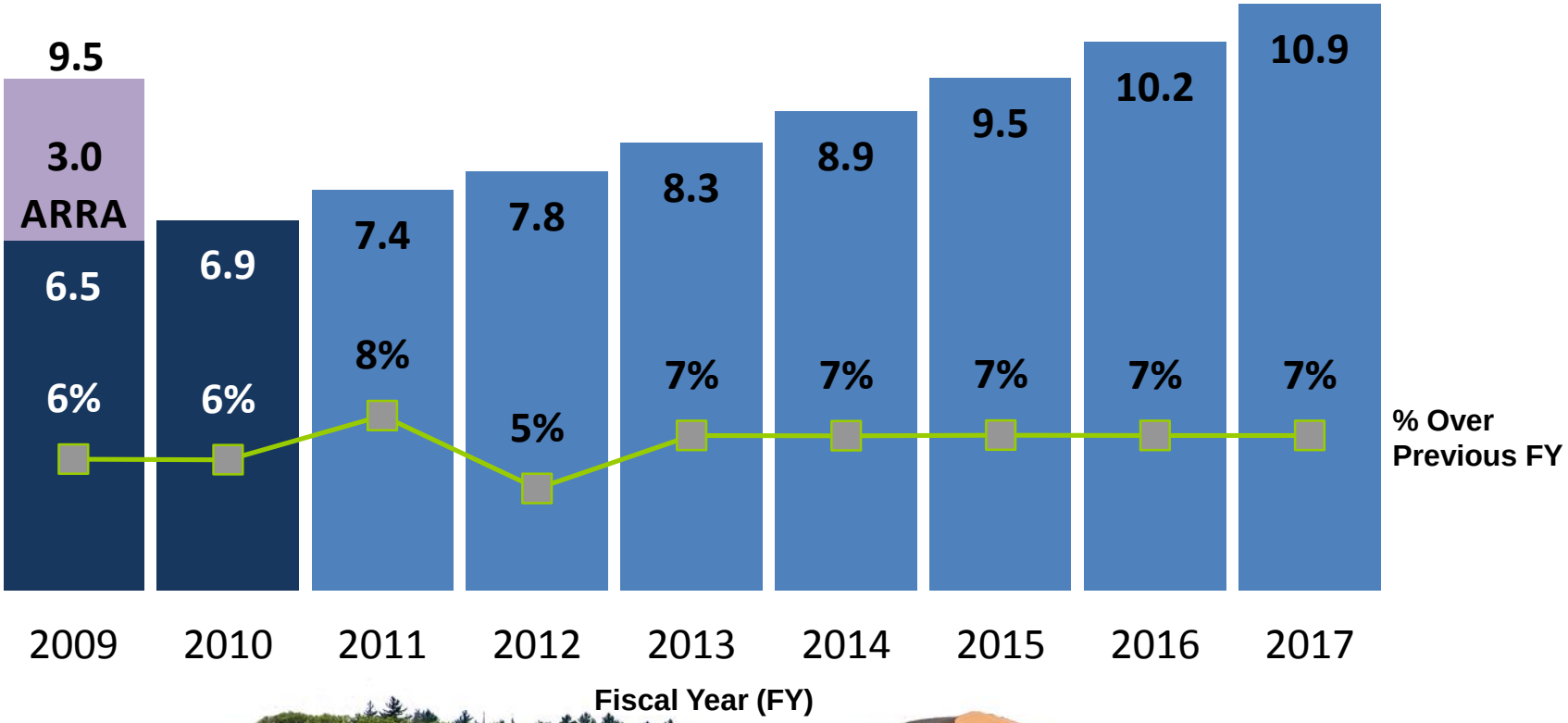
What datasets would be of interest to:

- General public to best highlight science contributions and benefits to society
- Your specific communities to keep them informed and engaged

- Domain/Area specific Challenge/Prizes that would:
  - Capture the imagination/interests of the general public. Eg. Video, essay, “name the xxxxxx…”
  - An interesting challenge to your communities, but also to those outside your specific communities e.g. “better mousetrap”

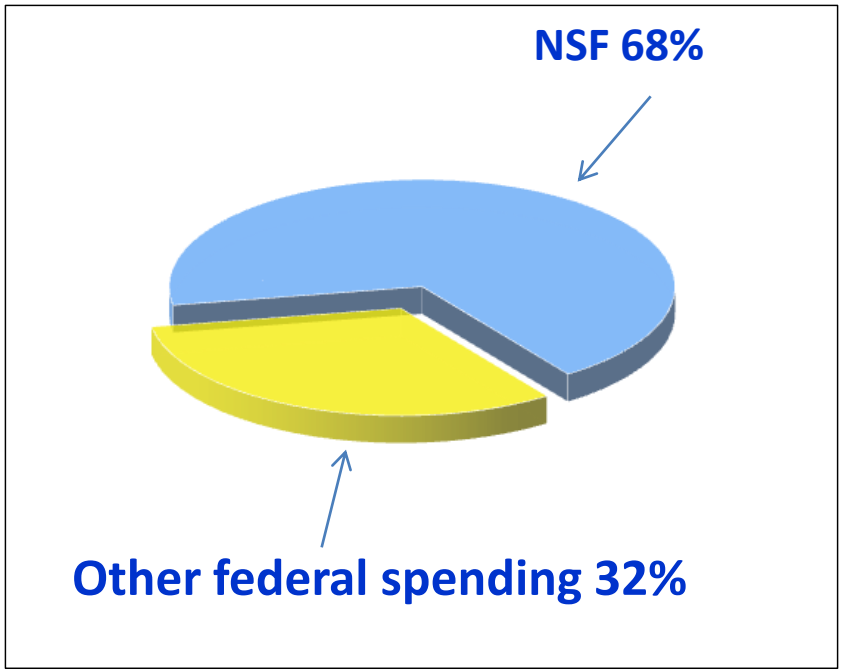
# President's Plan for Science and Innovation

## Total NSF Funding:
### FY 2009-FY 2017 (dollars in billions)

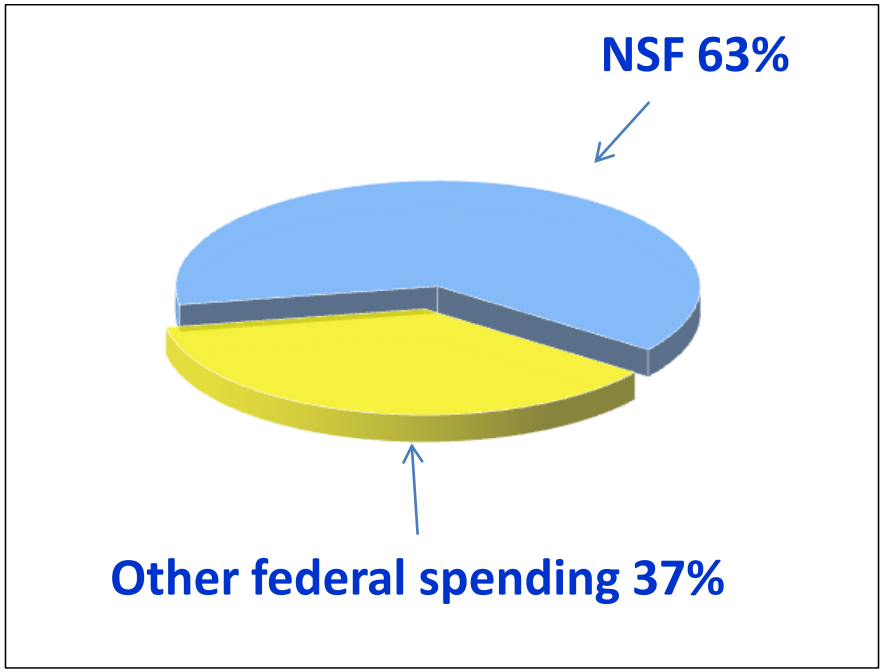


# BIO Support for Basic Research

Federal Support for Basic Research in Non-Medical Biological Sciences at Academic Institutions




Federal Support for Basic Research in Environmental Biology at Academic Institutions




# FY2011 Budget Request for Research & Related Activities by Directorate

| | FY 2009 Omnibus Actual | FY 2009 ARRA Actual | FY 2010 Current Plan | FY 2011 Request | Change from FY 2010 Current Plan | |
|---|---|---|---|---|---|---|
| | | | | | Amount | Percent |
| **Biological Sciences** | **$656.62** | **$260.00** | **$714.54** | **$767.81** | **$53.27** | **7.5%** |
| Computer & Information Science & Engineering | 574.50 | 235.00 | 618.83 | 684.51 | 65.68 | 10.6% |
| Engineering | 664.99 | 264.99 | 743.93 | 825.67 | 81.74 | 11.0% |
| Geosciences | 808.53 | 347.00 | 889.64 | 955.29 | 65.65 | 7.4% |
| Mathematical & Physical Sciences | 1243.88 | 474.97 | 1351.84 | 1409.91 | 58.07 | 4.3% |
| Social, Behavioral & Economic Sciences | 240.56 | 84.97 | 255.25 | 268.79 | 13.54 | 5.3% |
| Office of Cyberinfrastructure | 199.23 | 80.00 | 214.28 | 228.07 | 13.79 | 6.4% |
| Office of International Science & Engineering | 47.45 | 13.98 | 47.83 | 53.26 | 5.43 | 11.4% |
| Office of Polar Programs | 473.55 | 171.89 | 451.16 | 527.99 | 76.83 | 17.0% |
| Integrative Activities | 241.58 | 129.85 | 275.04 | 295.93 | 20.89 | 7.6% |
| U.S. Arctic Research Commission | 1.50 | 0.00 | 1.58 | 1.6 | 0.02 | 1.3% |
| Total, R&RA | $5,152.39 | $2,062.65 | $5,563.92 | $6,018.83 | $454.91 | 8.2% |

# FY 2011 Priorities

## RESEARCH

- Science, Engineering, and Education for Sustainability (SEES)
- Dimensions of Biodiversity
- Intersection of Life and Physical Sciences

## INFRASTRUCTURE

- Digitization of Collections
- National Ecological Observatory Network (NEON)

## EDUCATION

- Transforming Undergraduate Biology Education (TUBE)

## BIO Innovation Experiments

# Science, Engineering, and Education for Sustainability (SEES)
## Goals & Implementation

**SEES Goals:**

Advance climate and energy science, engineering, and education to inform the societal actions needed for environmental and economic sustainability and sustainable human well-being

Foster innovative insights about the environment-energy-economy nexus, especially at the regional scale

**SEES Implementation:**

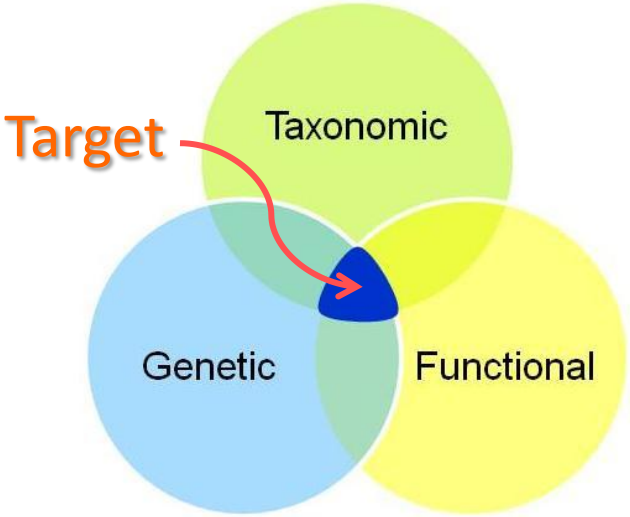
- Planned to continue through FY15
- Involves all research and education units: 7 Directorates and 4 Offices
- NSF FY11 Request: $ 765.5M Total
- BIO  FY11 Request: $ 5M (Total: $126M)

# SEES Activities

- FY 2010 Climate Research:
  - Water Sustainability and Climate (WSC)
  - Ocean Acidification (OA)
  - Earth Systems Models (EaSM)
  - Dimensions of Biodiversity (DB)
  - Climate Change Education (CCEP)
- Enhanced support in FY11 for:
  - Coupled Natural and Human Systems
  - Research Collaboration Networks
  - Multidisciplinary Postdocs
  - Core research

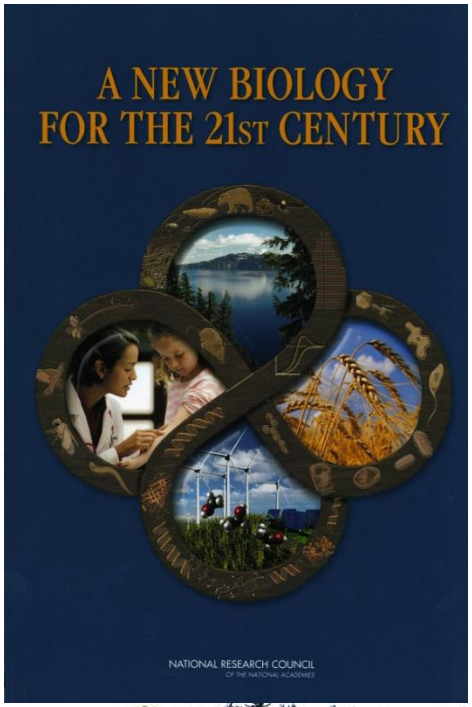
# Dimensions of Biodiversity

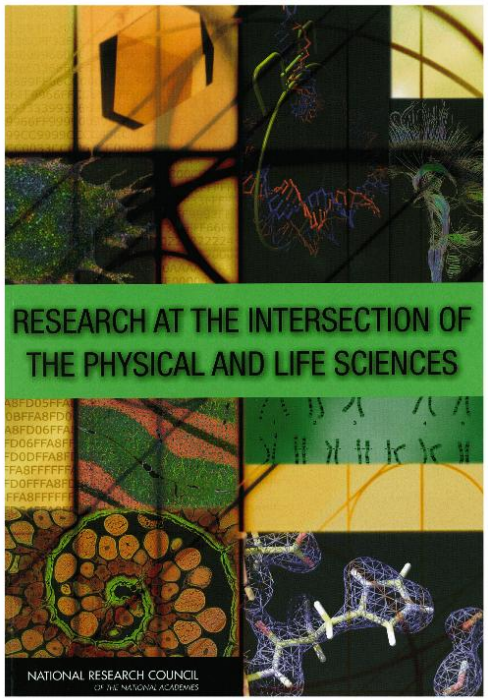
- 10-year campaign to characterize the dimensions of biodiversity on Earth
- In collaboration with GEO and OPP
- NSF Program Solicitation 10-548
  - Integrated approaches that targeted area of overlap
  - International RCNs



# Investing in Research at the Interface of the Biological and Physical Sciences

The Directorates for Biological Sciences (BIO) and Mathematical and Physical Sciences (MPS) are partnering in FY 2011 to identify and support potentially transformative research projects that explore this interdisciplinary interface.



# Advancing Digitization of Biological Collections (ADBC)

- Goal: Digitize all U.S. non-federal natural history collections
- FY10: Community developed strategic plan
- FY10-FY11: NSF Program Solicitation 10-603
  - Home Uniting Biocollections (HUB)
  - Thematic Collections Networks (TCN)

A Strategic Plan for Establishing a Network Integrated Biocollections Alliance

**Executive Summary**

This report is a strategic plan for a 10-year effort to digitize and mobilize the scientific information associated with biological specimens held in U.S. research collections. The primary objective of the initiative is to create a national collections resource that will contribute critical information to U.S. scientific research and technology interests, and will aid in understanding the biodiversity dimensions and societal consequences of climate change, species invasions, natural disasters, the spread of disease vectors and agricultural pests and pollinators, and other environmental issues. Network Integrated Biocollections Alliance (NIBA) resources such as databases, network portals, and analytical tools will synthesize information contained in the nation's collections and place them into national service for stakeholders in government, academia, business, K-12 education, informal science education, and the public.

Biological collections across the U.S. are united by over two centuries of common purpose in research vision, curatorial methods, and field protocols. Digitizing the nation's collections represents a grand challenge that will require development of technical and human resources, such as automated workflows, a robust data publishing and error-checking infrastructure and professionals networked to support the creation of an enduring digital alliance of collections institutions. These challenges can be addressed, in partnership with federal agency and other stakeholders, in order to create an organizational structure and processes that reflect the long-standing biological collection community values of inclusiveness, scientific empowerment and open data access, while allocating credit to data owners and editors.

Digitization of biological specimens will take place within the nation's collections facilities, which will be organized into networks having shared interests in geographic scope, taxonomic research domain, or specimen preservation type. These collaborations will be supported by a national digitization hub, whose responsibility will be to assure the successful implementation of the collaborative and inclusive digitization vision. The digitization hub will: establish collaboration protocols for consensus-based decision making among

Box 12

1

# National Ecological Observatory Network (NEON)

- New horizons for large-scale biology
  - Macro-systems Biology
- Schedule of Events
  - Airborne Observation Platform (AOP) Spectrometer: Construction begun in FY10
  - Readiness Review: April 2011
  - Domain Construction beginning July 2011
  - Operations & Maintenance Review:  August 2011

# Transforming Undergraduate Biology Education

Vision & Change
A VIEW FOR THE 21st CENTURY
in Undergraduate Biology Education

- Partnership with the Education and Human Resources (EHR) Directorate to build on 2009 Vision & Change Report

- FY 2011:
  - Continue Postdoctoral Research Fellowships with additional year teaching option
  - Enhanced support for RCN-UBE
  - Collaborate with EHR on STEM Talent Expansion Program (STEP) Center
  - Portfolio analysis and development of Logic Model to guide future investments

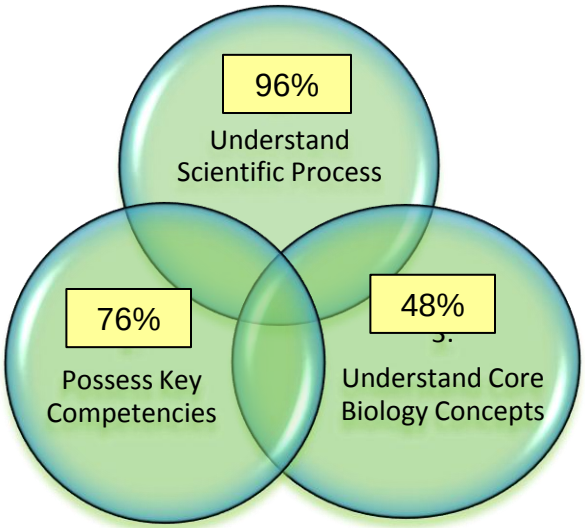
# Undergraduate BIO Education

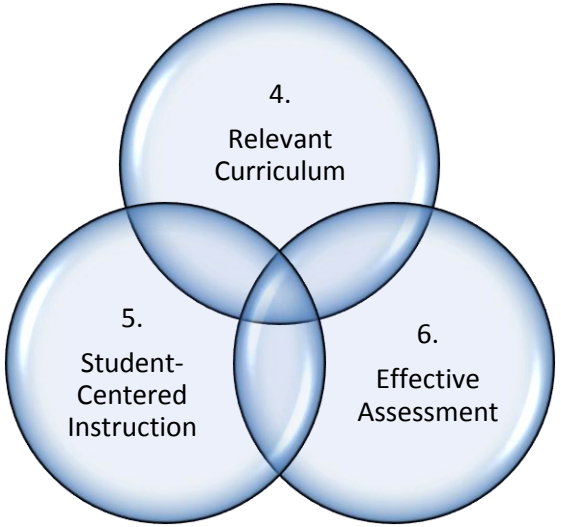
**Bins 1-3: V&C Goals for Students**

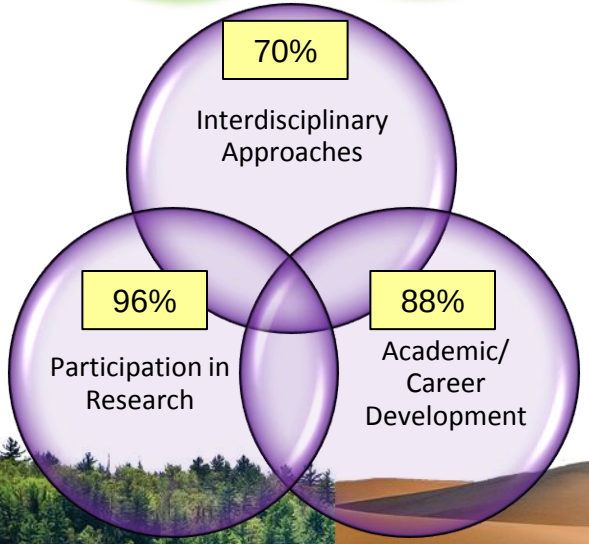
**Bins 4-6: V&C Strategies for Change - Coursework**

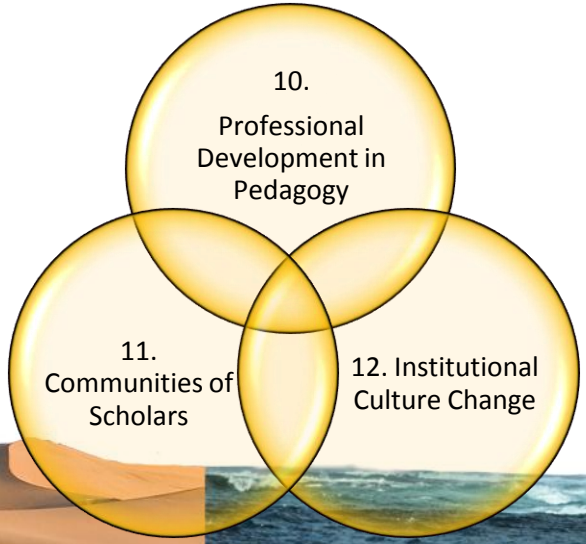
**Bins 7-9: V&C Strategies for Change – Beyond Coursework**

**Bins 10-12: V&C Institutional Strategies for Change**



# BIO Innovation Experiments: Exploring Novel Processes for Problem Solving

- **Ideas Lab**: Novel/high risk research project development coupled with real-time peer review

- **Enabling Partnerships to Enable Science:** Investigators network with potential collaborators on an NSF Wiki to advance development of needed research tools and resources (EAGER Proposals)

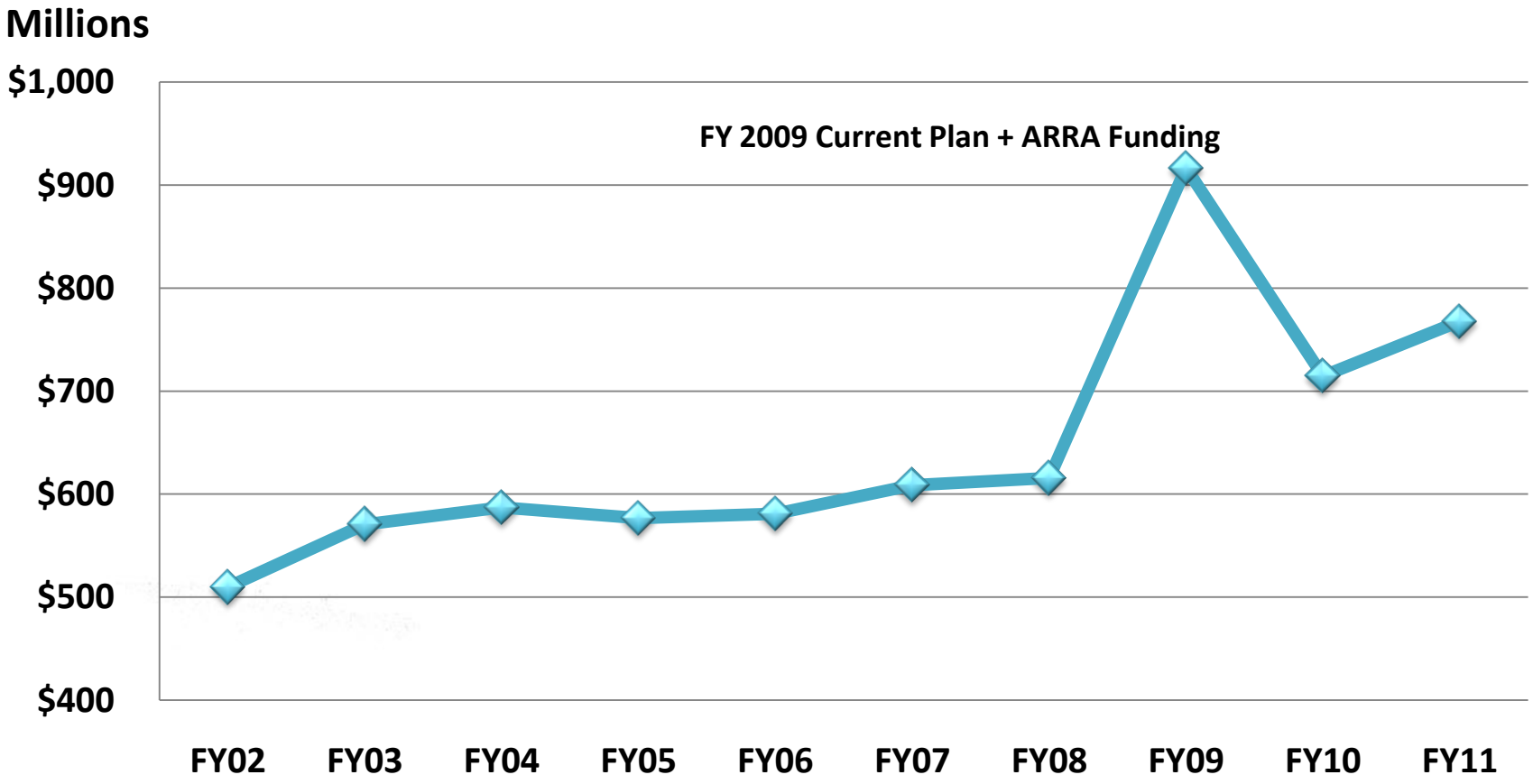
- **Big Pitch:** Compare review of short anonymous versions of full proposals that focus on main purpose and potential impacts of proposed research with review of full proposals for the same research

- **Grade Free Panel:** Compare normal panel review of proposals with review in which the panel does NOT grade the proposals or prepare a (consensus) panel summary



*Where discoveries begin*

# Recent Funding History of BIO FY 2002-2011




# BIO FY 2011 Budget Request

(dollars in millions)

| Division | FY 2009 Actuals | FY 2009 ARRA | FY 2010 Current Plan | FY 2011 Request | Change over FY2010 Request Amount |
|---|---|---|---|---|---|
| MCB | 121.28 | 61.53 | 125.59 | 133.69 | 8.10 |
| IOS | 212.34 | 61.71 | 216.25 | 226.70 | 10.45 |
| DEB | 120.37 | 63.23 | 142.55 | 155.59 | 13.04 |
| DBI | 117.95 | 38.74 | 126.86 | 145.63 | 18.77 |
| EF | 84.68 | 34.80 | 103.29 | 106.20 | 2.91 |
| **BIO Total** | **$656.62** | **$260.00** | **$714.54** | **$767.81** | **$53.27** |

## NSF 10-015
## Dear Colleague Letter: Cyberinfrastructure Framework for 21st Century Science and Engineering (CF21)

"CF21 will consist of geographically distributed locally-available cyberinfrastructure, advanced computing resources found at larger centers, software environments, advanced networks and data storage capabilities in the US and other nations…."

- Data Enabled Science
- Networks & Research Community Building
- New Computational & Software Infrastructure
- Connections to Instruments & Facilities